



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/689,198

10/20/2003

Joseph D. Rainville

GP-303508/8540G-000213

4431

27572 7590 03/31/2011  
HARNESS, DICKEY & PIERCE, P.L.C.  
P.O. BOX 828  
BLOOMFIELD HILLS, MI 48303

EXAMINER

ECHELMMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1729

MAIL DATE

DELIVERY MODE

03/31/2011

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/689,198	RAINVILLE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Alix Elizabeth Echelmeyer	1729	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 10, 17 and 20-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10, 17 and 20-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response***

1. This Office Action is in response to the Appeal Brief filed October 13, 2010. Claims 10, 17, and 20-26 are rejected for the reasons given below.

### ***Claim Interpretation***

2. Claims 10 and 21 contain language to a threshold rate and rapid transient mode, relating to the operation of the compressor. In the prosecution history, it is seen that the meaning of these terms has been discussed, specifically in the Rejections of 4/16/08, 10/30/08, and 2/18/09 and the responses of 7/16/08 and 1/29/09. The examiner understands these terms as referring to the change in capacity of the compressor. The rapid transient mode refers to a change from normal operation speed of the compressor, either speeding up or slowing down of the compressor, in response to increased demand or decreased demand, respectively, of power from the fuel cell. The threshold rate refers to how quickly the compressor changes in capacity, or speed. In normal operation, the compressor can change speed at a rate of less than 40% of its current speed per second. If a greater change in speed is required by the power demands on the fuel cell, then a rapid transient mode is used in which the change in speed of the compressor is greater than the change in speed during a normal mode of operation. In other words, if there is a sudden increase in the electrical requirements of the fuel cell output, and that demand cannot be met by the normal operation of the compressor

Art Unit: 1729

because the compressor cannot normally change its speed at a high enough rate to provide the needed oxidant, then a rapid transient mode upward is used.

3. If Applicant disagrees with the examiner's interpretation of the claim language, it is requested that Applicant clarify the claim limitations in the next response.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 10, 17 and 20-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Aberle et al. (US 2003/0077494) in view of Raiser (US 2002/0064695) and Lahiff (US 2003/0068538).

Aberle et al. teach a fuel cell system and method of operating the fuel cell system, where the fuel cell system comprises a fuel cell (2) and a compressor system (4, 5) to provide oxidant to the fuel cell.

The compressor system of Aberle et al. has a variable capacity. Regarding claim 20, when it is determined that an increase in power to the fuel cell is required, the compressor is operated to provide a power burst, or rapid transient mode upward ([0021]).

With further regard to claim 10 and regarding claims 24 and 26, the fuel cell controller is used to provide the power for this power burst from a supplemental power source, specifically a supercapacitor ([0011]).

With further regard to claims 10 and 21 and regarding claim 22, as to the change in capacity of the compressor, it is seen in Figure 3 that the threshold rate (13') is exceeded by the required rate (12'). In other words, the compressor is operating in an upward rapid transient mode.

Regarding claims 17 and 25, Aberle et al. teach that the power produced in the fuel cell is used to charge the supercapacitor ([0016]).

Aberle et al. fail to specifically teach that the threshold rate is 40%/s change in capacity. However, it would have been obvious to the skilled artisan that this threshold rate is an inherent property of the compressor that is chosen for the fuel cell system and is also based on the power provided to the compressor during normal operation.

With further regard to claims 10 and 21 and regarding claim 23, Aberle et al. fail to teach a rapid transient mode that is downward. The skilled artisan will recognize that such a mode is inherent to a fuel cell system, since when the demand for electrical power from the fuel cell decreases, the controller will provide less air to the fuel cell in order to provide less power so that power is not wasted. Such a downward rapid transient mode would have been obvious to the skilled artisan in order to conserve the

Art Unit: 1729

reactants used in the fuel cell and in order to provide the most efficient operation of the fuel cell as possible.

Aberle et al. fail to teach specifically that the fuel cell controller switches the power source from a main power source to the supplemental power source depending on the operation mode.

Raiser teaches a fuel cell system comprising a compressor for delivering oxidant to the fuel cell (abstract).

Raiser teaches that, during normal operation the compressor motor is powered by the fuel cell, but a switching device is used to provide power to the motor from a separate power source during different operation modes ([0017]-[0019]).

It would be desirable to use the switching device of Raiser in the fuel cell system of Aberle et al. so that, during the power bursts, the required power to drive the compressor motor is provided solely by the supercapacitor but during normal operation the compressor motor is driven by the power provided by the fuel cell since, if the fuel cell is not used to power the compressor during the power bursts, then all of the load from the fuel cell can be used to meet the required power demands.

Aberle et al. in view of Raiser fail to teach charging of the capacitor with energy generated by regeneratively braking the compressor motor.

Lahiff teaches a compressor for controlling oxidant to a fuel cell (abstract). The compressor is controlled by a controller ([0040]).

Lahiff further teaches regenerative braking of another motor in the system, where the derived current is used to charge the battery ([0003]). One of ordinary skill in the art would recognize the advantages with using regenerative braking of a motor to charge a battery: energy that might otherwise be wasted during braking can be conserved.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to capture the braking energy from the motor used for the compressor of Lahiff in order to conserve that energy that would otherwise be lost. It has been found that using known techniques to improve similar devices is obvious to the skilled artisan. MPEP 2141 III

### ***Response to Arguments***

6. Applicant's arguments have been considered but are moot in view of the new grounds of rejection, see above.

### ***Declaration***

7. The Declaration filed April 22, 2009 has been considered but not found to be convincing.

The Declarant argues, for example on the top of page 3, that Lahiff does not teach any mechanism to reclaim mechanical energy of the spinning compressor.

While this is true, the examiner notes that the claims do not require the specific mechanism for reclaiming mechanical energy, only that such energy is claimed.

Furthermore, as is discussed in the rejection above, the teachings of Lahiff that are relied upon are the general teachings of regenerative braking of a motor, not specifically regenerative braking of a compressor motor. However, it was also determined that one of ordinary skill in the art would find it obvious to apply the teachings of regenerative braking of a motor specifically to regenerative braking of a compressor motor and the results would be predictable.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ula Ruddock can be reached on 571-272-1481. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 1729

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ula C Ruddock/  
Supervisory Patent Examiner  
Art Unit 1729

Alix Elizabeth Echelmeyer  
Examiner  
Art Unit 1729

aee